14. Type and length of stemming;
15. If mats or other protections were used;
16. Type of delay detonator used and delay periods used; and
17. Seismograph records, where required, including:

A. Seismograph reading, including exact location of seismograph and its distance from the blast;

B. Name of person taking the seismograph reading; and

C. Name of person and firm analyzing the seismograph record.

Auth: section 444.535, RSMo (1986). Original rule filed July 13, 1978, effective Jan. 13, 1979. Amended: Filed July 15, 1980, effective Nov. 13, 1980.*

**Original authority 1978, amended 1988.*

10 CSR 40-2.090 Revegetation Requirements

PURPOSE: This rule complies with section 444.535.1(8), RSMo by setting forth the requirements for revegetation of lands affected by coal strip mining.

(1) General.

(A) The operator shall establish on all land that has been disturbed, a diverse, effective and permanent vegetative cover of species native to the area of disturbed land or species that will support the planned postmining uses of the land approved according to 10 CSR 40-2.030. For areas designated as prime farmland, the reclamation procedures of 10 CSR 40-2.110 shall also apply.

(B) Revegetation shall be carried out in a manner that encourages a prompt vegetative cover and recovery of productivity levels compatible with approved land uses. The vegetative cover shall be capable of stabilizing the soil surface with respect to erosion. All disturbed lands, except water areas and surface areas of roads that are approved as a part of the postmining land use, shall be seeded or planted to achieve a vegetative cover, of the same seasonal variety native to the area of disturbed land. If both the premining and postmining land use is intensive agriculture, planting of the crops normally grown will meet the requirement. Vegetative cover will be considered of the same seasonal variety when it consists of a mixture of species of equal or superior utility for the intended land use when compared with the utility of naturally occurring vegetation during each season of the year.

(C) On federal lands, the surface management agency shall be consulted for approval prior to revegetation regarding what species are selected and following revegetation, to determine when the area is ready to be used.

(2) Use of Introduced Species. Introduced species may be substituted for native species only if appropriate field trials have demonstrated that the introduced species are of equal or superior utility for the approved postmining land use, or are necessary to achieve a quick, temporary and stabilizing cover. These species substitution shall be approved in the reclamation plan. Introduced species shall meet applicable state and federal seed or introduced species statutes, and shall not include poisonous or potentially toxic species.

(3) Timing of Revegetation. Seeding and planting of disturbed areas shall be conducted during the first normal period for favorable planting conditions after final preparation. The normal period for favorable planting shall be that planting time generally accepted locally for the type of plant materials selected to meet specific site conditions and climate. Any disturbed areas, except water areas and surface areas of roads that are approved under 10 CSR 40-2.030 as part of the postmining land use, which have been graded shall be seeded with a temporary cover of small grains, grasses or legumes to control erosion until an adequate permanent cover is established. When rills or gullies, that would preclude the successful establishment of vegetation or the achievement of the postmining land use, form in regraded topsoil and overburden materials as specified in 10 CSR 40-2.040, additional regrading or other stabilization practices will be required before seeding and planting.

(4) Mulching. Mulch shall be used on all regraded and topsoiled areas to control erosion, to promote germination of seeds and to increase the moisture retention of the soil. Mulch shall be anchored to the soil surface where appropriate, to ensure effective protection of the soil and vegetation. Mulch means vegetation residues or other suitable materials that aid in soil stabilization and soil moisture conservation, thus providing microclimatic conditions suitable for germination and growth and do not interfere with the postmining use of the land. Annual grains such as oats, rye and wheat may be used instead of mulch when it is shown that the substituted grains will provide adequate stability and that they will later be replaced by species approved for the postmining use.

(5) Methods of Revegetation.

(A) The operator shall use technical publications or the results of laboratory and field tests approved in the reclamation plan to determine the varieties, species, seeding rates and soil amendment practices essential for establishment and self-regeneration of vegetation.

(B) Where hayland, pasture or range is to be the postmining land use, the species of grasses, legumes, browse, trees or forbs for seeding or planting and their pattern of distribution shall be selected by the operator to provide a diverse, effective and permanent vegetative cover with the seasonal variety, succession, distribution and regenerative capabilities native to the area. Livestock grazing will not be allowed on reclaimed land until the seedlings are established and can sustain managed grazing. The director, in consultation with the operator and the landowner or in concurrence with the governmental land managing agency having jurisdiction over the surface, shall determine when the revegetated area is ready for livestock grazing.

(C) Where forest is to be the postmining land use, the operator shall plant trees adapted for local site conditions and climate. Trees shall be planted in combination with an herbaceous cover of grains, grasses, legumes, forbs or woody plants to provide a diverse, effective and permanent vegetation cover with the seasonal variety, succession and regeneration capabilities native to the area.

(D) Where wildlife habitat is to be included in the postmining land use, the operator shall consult with appropriate state and federal wildlife and land management agencies and shall select those species that will fulfill the needs of wildlife, including food, water, cover and space. Plant groupings and water resources shall be spaced and distributed to fulfill the requirements of wildlife.

(6) Standards for Measuring Success of Revegetation.

(A) Success of revegetation shall be determined either by comparison to standards set forth in this rule or by comparison to reference areas approved in the reclamation plan. Reference areas mean land units of varying size and shape identified and maintained under appropriate management for the purpose of measuring ground cover, productivity and species diversity that are produced naturally. The reference areas must be representative of geology, soils, slope, aspect and vegetation in the permit area. Management of the reference area shall be comparable to that which will be required for the approved postmining land use of the area to be mined. Estimating techniques either established by the commission or approved in the reclamation plan will be used to determine the degree of success in the revegetated area.

(B) Standards for success shall be applied in accordance with the approved postmining land use and shall be met for two (2) growing seasons. However, ground cover of living

plants on the revegetated area shall in no case be less than that required to control erosion. In terms of specific land uses, the following minimum standards for success apply:

1. For areas reclaimed to pasture, the ground cover of living plants on the revegetated area shall be equal to ninety percent (90%);

2. For areas reclaimed to cropland, success in revegetation shall be determined on the basis of crop production from the disturbed area compared to crop production from a reference area. The average of a minimum of two (2) years' crop production from the disturbed area shall equal the corresponding average production of the approved reference area. Production on nonprime cropland shall be considered equal if it is at least ninety percent (90%) of the production of the reference area; whereas, production on prime farmland shall be considered equal if it is at least one hundred percent (100%) of the production of the reference area;

3. For areas reclaimed to woodland, the success of revegetation shall be determined on the basis of tree stocking. Specifically, a reclaimed area with a postmining land use of woodland must have a minimum stocking of four hundred fifty (450) countable stems per acre. A countable stem shall—

A. Have been in place for at least sixteen (16) months;

B. Be alive and healthy;

C. Have at least one-third (1/3) of its length in live crown; and

D. Not be in danger of being eliminated by herbaceous vegetation;

4. For areas reclaimed to wildlife habitat, the success of revegetation shall be determined on the basis of tree and shrub stocking and herbaceous ground cover. Specifically, a reclaimed area with a postmining land use of wildlife habitat must have a minimum stocking of two hundred twenty-five (225) countable stems where trees, shrubs, or both, are established and at least ninety percent (90%) ground cover where herbaceous vegetation is established. A countable stem shall meet the requirements described in paragraph (6)(B)3. of this rule;

5. Previously mined areas that were not reclaimed to the standards required by this chapter prior to November 15, 1976. The ground cover of living plants for those areas shall not be less than required to control erosion, and in no case less than that existing before redisturbance; and

6. Areas to be developed immediately for industrial or residential use. The ground cover of living plants shall not be less than required to control erosion. As used in this paragraph, immediately means less than two (2) years after regrading has been completed for the area to be used.

(C) Species diversity, distribution, seasonal variety and vigor shall be evaluated on the basis of the results which could reasonably be expected using the methods of revegetation approved under section (5) of this rule.

(7) Seeding of Stockpiled Topsoil. Topsoil stockpiled in compliance with 10 CSR 40-2.050 must be seeded or planted with an effective cover of nonnoxious quick growing annual and perennial plants during the first normal period for favorable planting conditions or protected by other approved measures as specified in 10 CSR 40-2.050.

Auth: section 444.535.1(8), RSMo (1986). Original rule filed July 13, 1978, effective Jan. 13, 1979. Amended: Filed June 3, 1985, effective Oct. 28, 1985. Amended: Filed April 2, 1986, effective July 26, 1986. Amended: Filed Aug. 4, 1987, effective Nov. 23, 1987.*

**Original authority 1978, amended 1988.*

10 CSR 40-2.100 Steep-Slope Mining Requirements

PURPOSE: This rule complies with section 444.535.2., RSMo by setting forth the requirements for strip mining on steep slopes.

(1) All the requirements of this chapter shall apply.

(2) In addition, the operator conducting coal strip mining and reclamation operations on natural slopes that exceed twenty degrees (20°), or on lesser slopes that require measures to protect the area from disturbance after grading is completed as determined in the reclamation plan after consideration of soils, climate, the method of operation, geology and other regional characteristics, shall meet the following performance standards. The standards of this section do not apply where mining is done on a flat or gently rolling terrain with an occasional steep slope through which the mining proceeds and leaves a plain or predominantly flat area:

(A) Spoil, waste materials or debris, including that from clearing and grubbing and abandoned or disabled equipment, shall not be placed or allowed to remain on the downslope;

(B) The highwall shall be completely covered with spoil and the disturbed area graded to comply with the provisions of 10 CSR 40-2.040. Land above the highwall shall not be disturbed unless the disturbance will facilitate compliance with the requirements of this section and is approved in the reclamation plan;

(C) Material in excess of that required to meet the provisions of 10 CSR 40-2.040(1)—(11) shall be disposed of in accordance with the requirements of 10 CSR 40-2.040(12) and (13); and

(D) Woody materials may be buried in the backfilled area only when burial does not cause or add to instability of the backfill. Woody materials may be chipped and distributed through the backfill when approved by the commission.

Auth: section 444.535.2., RSMo (1986). Original rule filed July 13, 1978, effective Jan. 13, 1979.*

**Original authority 1978, amended 1988.*

10 CSR 40-2.110 Prime Farmlands Performance Requirements

PURPOSE: This rule complies with section 444.535.1(1), RSMo by setting forth the requirements for reclamation by coal strip mine operators for prime farmland.

Editor's Note: The secretary of state has determined that the publication of this rule in its entirety would be unduly cumbersome or expensive. The entire text of the material referenced has been filed with the secretary of state. This material may be found at the Office of the Secretary of State or at the headquarters of the agency and is available to any interested person at a cost established by state law.

(1) Applicability.

(A) Operators of coal strip mining and reclamation operations conducted on prime farmland shall comply with all the requirements of this chapter in addition to the special requirements of this rule. Prime farmlands are those lands defined in section (2) of this rule that have been used for the production of cultivated crops including nurseries, orchards and other specialty crops and small grains for at least five (5) years out of the twenty (20) years preceding the date of the permit application.

(B) Nothing in this section shall apply to any permit issued prior to August 3, 1977, any revisions or renewals of that permit or any continuous and existing strip mining operation for which a permit was issued prior to August 3, 1977. To meet the criteria of a continuous and existing operation, the applicant must submit to the director for review the following:

1. Proof that a definite contract for the coal field, which they intend to mine, existed on August 3, 1977;

2. Proof that the permittee had a legal right to mine the lands prior to August 3, 1977, through ownership, contract or lease, but not including an option to buy, lease or contract;

3. Proof that the lands contain part of a continuous recoverable coal seam that was being mined in a single continuous mining pit (or multiple pits if the lands are proven to be part of a single continuous surface coal mining operation) begun under a permit issued prior to August 3, 1977;

4. A plan including any supportive data required by the director, outlining the proposed procedures to meet the productive capacity of the intended land use as declared in the permit, as per 10 CSR 40-2.090; and

5. A detailed map delineating the exempted acreage.

(2) For purposes of this rule—

(A) Prime farmland means those lands that meet the applicability requirements in section (1) of this rule and the specific technical criteria prescribed by the secretary of agriculture as published at 42 FedReg 42359 (August 23, 1977). These criteria are included here for convenience. Terms used in this section are defined in United States Department of Agriculture publications *Soil Taxonomy,* Agriculture Handbook 436; *Soil Survey Manual,* Agriculture Handbook 18; *Rainfall-Erosion Losses From Cropland,* Agriculture Handbook 282; and *Saline and Alkali Soils,* Agriculture Handbook 60. To be considered prime farmland, soils must meet all of the following criteria:

1. The soils have—

A. Aquic, udic, ustic or xeric moisture regimes and sufficient available water capacity within a depth of forty inches (40″) or, if the root zone is less than forty inches (40″) deep, in the root zone in order to produce the commonly grown crops in seven (7) or more years out of ten (10);

B. Xeric or ustic moisture regimes in which the available water capacity is limited but the area has a developed irrigation water supply that is dependable and of adequate quality (a dependable water supply is one in which enough water is available for irrigation in eight (8) out of ten (10) years for the crops commonly grown); or

C. Aridic or torric moisture regimes and the area has a developed irrigation water supply that is dependable and of adequate quality;

2. The soils have a temperature regime that is frigid, nexic, thermic or hyperthermic (pergelic and cryic regimes are excluded). These are soils that at a depth of ten inches (10″) have a mean annual temperature higher than thirty-two degrees Fahrenheit (32°F). In addition, the mean summer temperature at this depth in soils with a zero (0) horizon is higher than forty-seven degrees Fahrenheit (47°F); in soils that have no zero (0) horizon, the mean summer temperature is higher than fifty-nine degrees Fahrenheit (59°F);

3. The soils have a pH between 4.5 and 8.4 in all horizons within a depth of forty inches (40″) or, if the root zone is less than forty inches (40″) deep, in the root zone;

4. The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow food, feed, fiber, forage and oilseed crops common to the area to be grown;

5. The soils can be managed so that, in all horizons within a depth of forty inches (40″), or if the root zone is less than forty inches (40″) deep, in the root zone; during part of each year the conductivity of saturation extract is less than four (4) mmhos/cm and the exchangeable sodium percentage (ESP) is less than fifteen (15);

6. The soils are not flooded frequently during the growing season (less often than once in two (2) years);

7. The soils have a product of K (erodibility factor) × percent slope of less than 2.0 and a product of I (soil erodibility) × C (climatic factor) not exceeding sixty (60);

8. The soils have a permeability rate of at least 0.06 inch per hour in the upper twenty inches (20″) and the mean annual soil temperature at a depth of twenty inches (20″) is less than fifty-nine degrees Fahrenheit (59°F); the permeability rate is not a limiting factor if the mean annual soil temperature is fifty-nine degrees Fahrenheit (59°F) or higher; and

9. Less than ten percent (10%) of the surface layer (upper six inches (6″)) in these soils consists of rock fragments more coarse than three inches (3″).

(B) Renewal of permit shall mean a decision by the regulatory authority to extend the time by which the permittee may complete mining within the boundaries of the original permit, and revision of the permit shall mean a decision by the regulatory authority to allow changes in the method of mining operations within the original permit area or the decision of the regulatory authority to allow incidental boundary changes to the original permit;

(C) A pit shall be deemed to be a single continuous mining pit even if portions of the pit are crossed by a road, pipeline, railroad, powerline or similar crossing; and

(D) A single continuous surface coal mining operation is presumed to consist only of a single continuous mining pit under a permit issued prior to August 3, 1977, but may include noncontiguous parcels if the operator can prove by clear and convincing evidence that, prior to August 3, 1977, the noncontiguous parcels were part of a single permitted operation. For the purposes of this subsection, clear and convincing evidence includes, but is not limited to, contracts, leases, deeds or other properly executed legal documents (not including options) that specifically treat physically separate parcels as one (1) surface coal mining operation.

(3) Identification of Prime Farmland. Prime farmland shall be identified on the basis of soil surveys submitted by the applicant. The requirement for submission of soil surveys may be waived if the operator can demonstrate according to the procedures in section (4) of this rule that no prime farmlands are involved. Soil surveys shall be conducted according to standards of the National Cooperative Soil Survey, which include the procedures set forth in United States Department of Agriculture Handbooks 436, *Soil Taxonomy* and 18, *Soil Survey Manual* and shall include:

(A) Data on moisture availability, temperature regime, flooding, water table, erosion characteristics, permeability or other information that is needed to determine prime farmland in accordance with section (2) of this rule;

(B) A map designating the exact location and extent of the prime farmland; and

(C) A description of each soil mapping unit.

(4) Negative Determination of Prime Farmland. The land shall not be considered as prime farmland where the operator can demonstrate one (1) or more of the following situations:

(A) Lands within the proposed permit boundaries have been used for the production of cultivated crops for less than five (5) years out of twenty (20) years preceding the date of the permit application;

(B) The slope of all land within the permit area is ten percent (10%) or greater;

(C) Land within the permit area is not irrigated or naturally subirrigated, has no developed water supply that is dependable and of adequate quality and the average annual precipitation is fourteen inches (14″) or less;

(D) Other factors exist, such as a very rocky surface, or the land is frequently flooded, which clearly place all land within the area outside the purview of prime farmland; and

(E) A written notification, based on scientific findings and soil surveys that land within the proposed mining area does not meet the applicability requirements in section (1) of this rule, is submitted by a qualified person other than the operator and is approved in the reclamation plan.

(5) Plan for Restoration of Prime Farmland. The operator shall submit a reclamation plan for the mining and restoration of any prime farmland within the proposed permit boundaries. This plan shall be used in judging the technological capability of the operator to restore prime farmlands. The plan shall include:

(A) A description of the original undisturbed soil profile, as determined from a soil survey, showing the depth and thickness of each of the soil horizons that collectively constitute the root zone of the locally adapted crops and are to be removed, stored and replaced;

(B) The proposed method and type of equipment to be used for removal, storage and replacement of the soil in accordance with section (7) of this rule;

(C) The location of areas to be used for the separate stockpiling of the soil and plans for soil stabilization before redistribution;

(D) If applicable, documentation, such as agricultural school studies or other scientific data from comparable areas that supports the use of other suitable material instead of the A, B or C soil horizon, to obtain on the restored area equivalent or higher levels of yield as nonmined prime farmlands in the surrounding area under equivalent levels of management;

(E) Plans for seeding or cropping the final graded mine land and the conservation practices to control erosion and sedimentation during the first twelve (12) months after regrading is completed. Proper adjustments for seasons must be made so that final graded land is not exposed to erosion during seasons when vegetation or conservation practices cannot be established due to weather conditions; and

(F) Available agricultural school studies, company data or other scientific data for comparable areas that demonstrate that the operator using his/her proposed method of reclamation will achieve within a reasonable time, equivalent or higher levels of yield after mining as existed before mining.

(6) Consultation with Secretary of Agriculture and Issuance of Permit.

(A) The commission may grant a permit which shall incorporate the plan submitted under section (5) of this rule if it finds in writing that the applicant—

1. Has the technological capability to restore the prime farmland within the proposed permit area, within a reasonable time, to equivalent or higher levels of yield as nonmined prime farmland in the surrounding area under equivalent levels of management; and

2. Will achieve compliance with the standards of section (7) of this rule.

(B) Before any permit is issued for areas that include prime farmlands, the commission will consult with the secretary of agriculture or his/her designee. The secretary of agriculture will provide a review of the proposed method of soil reconstruction and comment on possible revisions that will result in a more complete and adequate restoration.

(7) Special Requirements. For all prime farmlands to be mined and reclaimed, the operator shall meet the following special requirements:

(A) All soil horizons to be used in the reconstruction of the soil shall be removed before drilling, blasting or mining to prevent contaminating the soil horizons with undesirable materials. Where removal of soil horizons results in erosion that may cause air and water pollution, the reclamation plan shall specify methods of treatment to control erosion of exposed overburden. The operator shall remove separately the—

1. Entire A horizon or other suitable soil materials which will create a final soil having an equal or greater productive capacity than that which existed prior to mining in a manner that prevents mixing or contamination with other material before replacement;

2. B horizon of the natural soil or a combination of B horizon and underlying C horizon or other suitable soil material that will create a reconstructed root zone of equal or greater productive capacity than that which existed prior to mining in a manner that prevents mixing or contamination with other material; and

3. Underlying C horizons or other strata, or a combination of these horizons or other strata, to be used instead of the B horizon that are of equal or greater thickness and that can be shown to be equal or more favorable for plant growth than the B horizon and that when replaced will create in the reconstructed soil a final root zone of comparable depth and quality to that which existed in the natural soil;

(B) The A horizon and B horizon must be stored separately from each other, if stockpiling of soil horizons is allowed in the reclamation plan in lieu of immediate replacement. The stockpiles must be placed within the permit area and where they will not be disturbed or exposed to excessive erosion by water or wind before the stockpiled horizons can be redistributed on terrain graded to final contour. Stockpiles in place for more than thirty (30) days must meet the requirements of 10 CSR 40-2.050(4);

(C) The final graded land must be scarified before the soil horizons are replaced;

(D) The material from the B horizon, or other suitable material specified in paragraph (7)(A)2. or 3. of this rule must be replaced in such a manner as to avoid excessive compaction of overburden and to a thickness comparable to the root zone that existed in the soil before mining;

(E) The A horizon or other suitable soil materials, which will create a final soil having an equal or greater productive capacity than existed prior to mining, as the final surface soil layer to the thickness of the original soil as determined in paragraph (7)(A)1. of this rule must be replaced in a manner that—

1. Prevents excess compaction of both the surface layer and underlying material and reduction of permeability to less than 0.06 inch per hour in the upper twenty inches (20″) of the reconstructed soil profile; and

2. Protects the surface layer from wind and water erosion before it is seeded or planted; and

(F) Nutrients and soil amendments must be applied as needed to establish quick vegetative growth.

Auth: sections 444.535.1(1) and 444.810, RSMo (1986). Original rule filed July 13, 1978, effective Jan. 13, 1979. Amended: Filed Nov. 10, 1980, effective Feb. 12, 1981. Amended: Filed April 1, 1988, effective July 1, 1988. Amended: Filed Sept. 15, 1988, effective Jan. 15, 1989. Amended: Filed March 2, 1989, effective May 15, 1989. Amended: Filed July 3, 1990, effective Nov. 30, 1990.*

**Original authority 444.535.1(1), RSMo (1978), amended 1988; and 444.810, RSMo (1979), amended 1983.*